



**ABOVE** • Smiles abounded at Take Your Child to Work Day/Earth Day. See story below.

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# nih record

*'Humans, Neanderthals Kissing Cousins?'*

## Archaic Genomics Adds Detail to History of Humanity

By Carla Garnett

Once upon a time, a Swedish scientist named Dr. Svante Pääbo was fascinated with the history of ancient peoples. Besides becoming an esteemed paleontologist, Pääbo also grew into something of a scientific storyteller, recounting a 500,000-year-old narrative over the course of a three-decades-long career in genomics. He continues to tap archaic DNA to add rich detail to the story.

Now director of the Max Planck Institute for Evolutionary Anthropology and a founder of paleogenetics, Pääbo is "truly an authority on the study of ancient DNA," said NHGRI director Dr. Eric Green. NHGRI hosted Pääbo's recent lecture at NIH, "The Neanderthal and Denisovan Genomes."

### Who Were the Earliest People?

Pääbo divided his talk into three parts: technical aspects of retrieving ancient DNA and sequencing ancient genomes; what we've learned from studying the genes of our



Dr. Svante Pääbo

SEE **ARCHAIC GENOMICS**, PAGE 4



Alanna Espiritu enjoys robotic surgery lab.

*Science Is Cool!*

### Take Your Child to Work, Earth Day Add Fun to Science

By Dana Steinberg

It's quite possible NIH has the coolest Take Your Child to Work Day anywhere. There are so many fascinating and interactive activities that the adults learn and have as much fun as the kids.

Some youngsters explored the wonders of the brain.

Others learned

about vision, hearing, bones and teeth. Some looked at bugs, genes or stem cells under a microscope. Some kids even maneuvered a surgical robot arm, learning about the role of technology in health care.

SEE **YOUNGSTERS**, PAGE 6

### Tree of Hippocrates Meets 21st Century Science at Dedication Ceremony

By Shana Potash

The Tree of Hippocrates has a new life on the NIH campus and a new place in 21st century science.

A tree cloned from the one removed last year was planted in front of the National Library of Medicine during a ceremony that also included the unveiling of the first DNA barcode of the tree. The ceremony took place Apr. 25, which was both Arbor Day and DNA Day.

"We are in essence, through science, returning the Tree of Hippocrates to our campus and also renewing, reinvigo-



SEE **TREE**, PAGE 8



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*NIH...Turning Discovery Into Health*

## briefs

### 7th Annual NIH Take a Hike Day, June 5

In support of White House initiatives promoting a healthier federal workforce and the Surgeon General's National Prevention Strategy, NIH'ers are encouraged to participate in the 7th annual "Take a Hike" event on Thursday, June 5 from 11:30 a.m. to 1:30 p.m. in front of Bldg. 1. All employees and contractors are invited to walk around the perimeter of campus (about 3.25 miles), rain or shine. Support your institute/center when you register. For more information visit [www.ors.od.nih.gov/pes/dats/wellnes/hike/Pages/hike.aspx](http://www.ors.od.nih.gov/pes/dats/wellnes/hike/Pages/hike.aspx).

### HHS Green Champion Awards at NIH, June 3

Employees are invited to the 2014 HHS Green Champion Awards Ceremony for NIH recipients on Tuesday, June 3 at 9 a.m. in Kirschstein Auditorium, Natcher Bldg. The awards recognize excellence and innovation by HHS employees for sustainability efforts in FY 2013. Seating will be first-come, first-served. Sign language interpreters will be provided. A meet & greet event will be held at 8:30 a.m. for awardees and guests. Individuals with disabilities who need reasonable accommodation to participate should contact Amy Blackburn at (301) 496-7990 or [amyb@mail.nih.gov](mailto:amyb@mail.nih.gov).

### Information Security & Privacy Awareness Refresher Training Are Combined

Two mandatory courses—the information security and privacy awareness refreshers—have been combined. The new format includes both modules and provides a bookmarking feature that allows you to return to the location where you left the course.

Completion of the fiscal year 2014 annual refresher will provide information about your responsibilities to secure NIH resources and protect all forms of personal information, whether it belongs to you, a member of the public, grant applicant, research study participant or patient of the Clinical Center. You will also hear about what you can do in the event of a computer security incident or breach of data to mitigate the risk of harm to the agency and individuals whose information has been compromised.

You will be notified by your institute/center information systems security officer (ISSO) and/or privacy coordinator to take the training within a specified timeframe.

Find the refresher on the NIH Information Security and Privacy Awareness Training web site, <http://irtsectraining.nih.gov/>.

If your IC has identified you as having significant IT security responsibilities, you may be asked to take—or certify you have taken—appropriate

role-based security training. Individuals due for this training will be notified by their ISSO.

If you have questions concerning the mandatory training requirement, contact Karen Plá, Office of the Senior Official for Privacy, (301) 402-6201, [plak@mail.nih.gov](mailto:plak@mail.nih.gov); Cheryl Ann Seaman, Information Security and Awareness Office, (301) 402-4461, [cheryl.seaman@nih.gov](mailto:cheryl.seaman@nih.gov).



### Savova To Give NLM Informatics Lecture

Dr. Guergana Savova will present "Temporal Relation Discovery from the Clinical Narrative" as part of the National Library of Medicine Informatics Lecture Series on Wednesday, June 4 from 2 to 3 p.m. in Natcher Auditorium, balcony A.

The lecture will cover current research problems in natural language process-

ing (NLP) such as event and temporal expression discovery and linking of events to create timelines of patients' clinical histories—a research program funded by grants from NLM.

Savova is associate professor at Harvard Medical School and Boston Children's Hospital. Her research interests are in NLP especially as applied to the text generated by physicians (the clinical narrative).

Savova is on the editorial board of the *Journal of the Medical Informatics Association* and is a reviewer for several journals including the *Journal of Biomedical Informatics* and *Journal of Language Resources and Evaluation*. She is also a member of NLM's biomedical library and informatics review committee. She holds a Ph.D. in linguistics with a minor in cognitive science and a master's of science in computer science from the University of Minnesota.

The lecture, sponsored by NLM's Extramural Programs Division, will be broadcast live and archived at <http://videocast.nih.gov/>. For event details, contact Dr. Jane Ye, (301) 594-4882, [yej@mail.nih.gov](mailto:yej@mail.nih.gov).

Sign language interpreters will be provided. Individuals who need reasonable accommodation to participate should contact Ebony Hughes, (301) 451-8038, [Ebony.Hughes@nih.gov](mailto:Ebony.Hughes@nih.gov) or the Federal Relay, 1-800-877-8339.

### Correction to HIV/AIDS Story

In the May 9 issue of the *NIH Record*, in a story headlined "Despite Progress, Challenges Remain in Fight Against HIV/AIDS," there was an error. We reported, "Typically, patients with AIDS do not contract opportunistic infections when their CD4 count falls below 200." Patients with AIDS do contract infections when their CD4 count gets that low.

# nih record



## Deyo Discusses Therapies for Low-Back Pain

By Ellen O'Donnell

Chronic low-back pain is an enormous public health problem. Many patients turn to complementary health approaches and, although there is an array of options, study results are often conflicting or non-definitive. Dr. Richard Deyo took listeners through the territory in his recent talk, "Manipulating the Pain: Chiropractic and Other 'Alternative' Treatments for Back Pain," part of NCCAM's Integrative Medicine Research Lecture Series.



Deyo is an internist, Kaiser Permanente professor of evidence-based family medicine at Oregon Health and Science University and a researcher. He also co-chairs the NIH Pain Consortium's task force on research standards for chronic low-back pain, which released a major report on Apr. 25.

Chiropractic, acupuncture and massage are the most popular complementary approaches for back pain. Deyo provided a brief perspective of clinical research findings on each, including information from studies he conducted with Group Health Cooperative scientists. The research challenges, he said, include teasing out treatment effects from the fact that most patients get significantly better on their own within a month; regression to the mean (i.e., from patients tending to seek care primarily when their symptoms are most extreme); placebo effects; and the effects of receiving caring attention from a professional. These questions illustrate, he said, why randomized, controlled trials in this area are essential.

Many interesting findings have emerged from clinical trials comparing true needle acupuncture, for example, to sham acupuncture (e.g., as done with toothpicks that don't penetrate the skin) or comparing different types of massage. In Deyo's studies, active interventions and controls are compared to usual care. He described the big picture as suggesting that benefits from the three complementary approaches are at least equal to—and for short-term relief, may be better than—usual care for low-back pain, although possibly for different patients and from different mechanisms.

"A common thread might be the healing power of touch," he said.

"It's ambiguous, still, whether [these] results are better than a convincing placebo," Deyo added. "But I've come to the view that maybe we can live

with that ambiguity. The effects on actual back-pain disability are likely relatively small. Serious side effects are very rare. At least from our analyses [of Medical Expenditure Panel Survey data], there is no evidence that these treatments would add to health-care costs. You might argue that they are no better than conventional medical care, but they do seem to be better in clinical trials, and certainly not worse."

As Deyo reminded attendees, "Much of what we do in conventional care may also involve the placebo effect and can be less safe."

Deyo termed these therapies "a reasonable choice for interested patients with non-specific low-back pain" but added that "to obtain more durable relief may require long-term exercise and/or cognitive-behavioral therapy."

His lecture is available at <http://videocast.nih.gov/Summary.asp?File=18391&bhcp=1> and is being added to NCCAM's Online Continuing Education Series. 🗎

## Sejnowski To Give 2014 Leiter NLM/MLA Lecture, June 12

Dr. Terrence Sejnowski will give the 2014 Joseph Leiter NLM/Medical Library Association (MLA) Lecture on Thursday, June 12 at 1 p.m. in Lister Hill Auditorium, Bldg. 38A.



Sejnowski is a pioneer in computational neuroscience. His goal is to understand the principles that link brain to behavior. He is interested in the hippocampus, which is believed to play a major role in learning and memory, and the cerebral cortex, which holds our knowledge of the world and how to interact with it. His laboratory uses both experimental and modeling techniques to study the biophysical properties of synapses and neurons and the population dynamics of large networks of neurons. Sejnowski hopes to gain new knowledge of how the human brain is capable of learning and storing memories. This knowledge ultimately may provide medical specialists with critical clues to combating Alzheimer's disease and other disorders that rob people of the ability to remember faces, names, places and events.

Sejnowski is an investigator with the Howard Hughes Medical Institute and holds the Francis Crick chair at the Salk Institute for Biological Studies. He is also a professor of biology at the University of California, San Diego, where he is co-director of the Institute for Neural Computation and co-director of the Temporal Dynamics of Learning Center. He has published more than 400 scientific papers and 12 books, including *The Computational Brain*, with Patricia Churchland. He is a member of the Institute of Medicine, National Academy of Sciences and the National Academy of Engineering, one of only 13 living people to be a member of all 3 national academies.

Sejnowski was instrumental in shaping the BRAIN Initiative that was announced by the White House in April 2013 and serves on the initiative's working group of the advisory committee to the NIH director.

Sejnowski's lecture will be recorded and broadcast live on the web at <http://videocast.nih.gov>.

The lecture was established in 1983 to stimulate intellectual liaison between MLA and NLM. Leiter was a major contributor in cancer research at the National Cancer Institute and a leader at NLM as a champion of medical librarians and informatics pioneer. He served as NLM associate director for library operations from 1965 to 1983.



## ARCHAIC GENOMICS

CONTINUED FROM PAGE 1

### Above:

*Showing a slide (l) of the reconstructed skeleton of a Neanderthal compared to a present-day human, Pääbo described the extinct group as “a robust form of hominids.” The Neanderthal population appears to have been physically stronger and hardier than contemporary humans. Researchers surmise that these earlier people were better suited physique-wise to survive colder climes than we are today. In addition, they had larger cranial capacity than we do.*

LECTURE PHOTOS: BILL BRANSON  
SLIDE IMAGES: SVANTE PÄÄBO

closest extinct relatives; and “where we go from here—how we can use these genomes to try to get to functional differences between us and other organisms.”

The storyteller began by offering the basic, most recent African-origin model of the emergence of contemporary humans.

“Modern humans evolved in Africa, accumulated variation there and a part of that variation went out and colonized the rest of the world” an estimated 100,000 years ago or less, Pääbo said. “There is a problem with that model, however. A hundred thousand years ago there were many other forms of humans around, most famously the Neanderthals in Europe and, in Asia, other less well-described forms of humans.”

Showing a slide of the reconstructed skeleton of a Neanderthal compared to a present-day human, Pääbo described the extinct group as “a robust form of hominids” that appeared in the fossil record about 400,000 years ago and disappeared about 30,000 years ago.

The Neanderthal population appears to have been physically stronger and hardier than contemporary humans. Researchers surmise that these earlier people were better suited physique-wise to survive colder climes than we are today. In addition, they had larger cranial capacity than we do.

### Tale of Two Theories

For some time, Pääbo said, “there have been two major ideas in paleontology about how modern humans relate to Neanderthals and other extinct forms when they come out of Africa.”

One model—called “total replacement”—holds that modern humans evolved in Africa and left the region without ever mixing with any oth-

er hominid, effectively superseding the other forms. The other model agrees that there was replacement but allows that there was also most likely some interbreeding among early human forms after the exodus from Africa into areas of Europe and Asia, where modern humans then gradually picked up genetic variations and ultimately evolved.

Pääbo said the first chance to test the ideas genetically came in the mid-1990s when scientists gained access to “not just any Neanderthal, but ‘The Neanderthal’ [from Neander Valley, Germany] that was found in 1856 and gave its name to this group of hominids...It was actually the first time we realized there had been other forms of humans here besides present-day humans.”

Using PCR and other technologies of the time, DNA studies in the 90s focused on the mitochondrial genome (mtDNA).

“It’s quite clear that there are no people walking around on the planet today with the mitochondrial genome from Neanderthals,” Pääbo said of his findings released in 1997. The total replacement model held up.

“We learned something else from those studies as well,” he noted. “Neanderthals cannot be very different from us.” Modern humans shared a common ancestor with Neanderthals about half a million years ago or later.

### High-Throughput a Game-Changer

Then, along comes high-throughput DNA sequencing, which transformed the field. Pääbo and his team received funding to sequence a draft of the entire Neanderthal genome, which they worked on from 2005 to 2010 using bones from three different individuals found in a Croatian cave. In 2009, the team collaborated with Dr. Jim Mullikin, director of NIH’s Intramural Sequencing Center at NHGRI.



*NIH director Dr. Francis Collins (l) and NHGRI director Dr. Eric Green (r) join Pääbo in Masur as he reunites with 2009 collaborator Dr. Jim Mullikin of NIH’s Intramural Sequencing Center.*





*The best Neanderthal bones have 4 percent endogenous DNA; 70 percent endogenous DNA was extracted from a child's pinky bone found in the Denisova Cave. The bone part was about one-quarter the size of a penny, as shown in this slide image.*

One of the first—and most controversial—questions Pääbo tackled with the new capabilities was, what happened when modern humans exited Africa and met Neanderthals? Did they mix or not?

“We went about it several different ways,” Pääbo confided, “because there are wars in paleontology about this and I had the feeling we had to get it really right.”

*“All these human groups have mixed with each other, but generally it's mixture of low magnitude. We have always mixed at least a little.”*

His group started with a premise: “If there was a contribution from Neanderthals to people in Europe, [then] we would expect people in Europe to share more alleles with Neanderthals than with people in Africa, where there have never been Neanderthals.”

Scientists tested 5 different sample genomes: 1 European, 2 Africans, 1 from Papua New Guinea and 1 from China.

### Hello, Cousins?

The results were unexpected: The Neanderthal shared a similar number of alleles with the genomes from places where Neanderthals had never lived.

“This was very surprising to us at the time, because if we would see a contribution we would have expected it in Europe, where Neanderthals have lived, not in Papua New Guinea and China.”

Pääbo's explanation? “When modern humans came out of Africa between 50,000 and 100,000 years ago they presumably passed by the Middle East and we know Neanderthals lived there. So those modern humans mixed with Neanderthals and then became the ancestors of everybody outside Africa.

They carried with them this Neanderthal contribution out into the world to the extent that people outside Africa have something between 1 and 2 percent of their genome from Neanderthals.”

### A Little DNA Goes a Long Way

In 2010, using DNA from a bone fragment found in a cave, Pääbo identified a newly discovered extinct species predating modern humans, the Denisovan. “It was the first time an extinct group of human was described just from a genome species,” he said. “We have improved our methods quite dramatically for retrieving small amounts of damaged DNA.”

The best Neanderthal bones have 4 percent endogenous DNA; 70 percent endogenous DNA was extracted from a child's pinky bone found in the Denisova Cave in southern Siberia, where China, Kazakhstan, Mongolia and Russia meet. The bone part was about one-quarter the size of a penny.

“So I think this is a good indication of what will happen much more in archeology in the future,” Pääbo suggested. “From tiny little bones, you can reconstruct a lot of the population history of individuals you find, but [it is] very frustrating [that] you have no idea how the skeleton of this individual looked, what stone tools they made, et cetera.”

Pääbo recounted the probable emergence of Neanderthals and Denisovans, according to genomic data. “[About 500,000 years ago] we think they have an origin in Africa, migrated out of Africa and evolved in western Eurasia to Neanderthals and eastern Eurasia to Denisovans,” he said. “Then modern humans emerge in Africa, come out of Africa and mix with Neanderthals presumably in the Middle East and around 50,000 years ago start spreading seriously over the world. They mix once more with Neanderthals—perhaps in central Asia—and they mix with Denisovans somewhere in southeast Asia and continue out into the Pacific. Then these forms [Neanderthals and Denisovans] become extinct, but they live on a little bit in people today.”

### ‘Total Replacement’ Idea Has Holes

“So, we’ve clearly rejected the notion of total replacement,” Pääbo concluded. “We have contributions from these extinct forms, but the major picture is of an exodus out of Africa. Most of our variation comes out of Africa.”

He coined a term for this new picture of evolution, “leaky replacement.”


“There is replacement,” he explained, “but a bit of genetic contribution from these other forms.

“All these human groups have mixed with each other, but generally it's mixture of low magnitude. We have always mixed at least a little.”

### Next Chapter More Challenging

What intrigues Pääbo most for future research, he said, is how to use genomics to discover changes that led to functional differences between extinct peoples and us. Stone tools and technology among the whole range of extinct populations were fairly identical and changed little over time, he explained, until contemporary people arrived.

“When modern humans come, all that changes,” Pääbo said. “Technology starts changing rapidly and becomes regionalized.” People in different areas start making different tools. “We have existed only about a third of the time that Neanderthals existed on the planet and...we can all agree that our technology today is quite different than 50,000 years ago.”

You can view Pääbo's entire hour-long NIH talk on NHGRI's channel at [www.youtube.com/watch?v=M7VdRKQuAa8](http://www.youtube.com/watch?v=M7VdRKQuAa8). 





## YOUNGSTERS

CONTINUED FROM PAGE 1

### **Above, from l:**

CC anesthesiologist Dr. Muhammed Yousef shows kids how to intubate a patient, using a surgical robotic arm on a dummy.

Ragini Mehta (r) leads the microbiology session at “Fantastic Voyage” through the CC department of laboratory medicine.

### **Below, from l:**

Mia Thomason (l), daughter of OD’s Kristen Dunn-Thomason, and Eileen Luo, daughter of NHLBI’s Yan Luo, fearlessly hold Madagascar hissing cockroaches. Guidance is provided by a volunteer from the Army Medical Research Institute of Infectious Diseases.

NIAID’s Dr. Dawei Lin is joined by his kids Samuel and Heather, who is holding up a Lego double helix.

NBC’s Veronica Johnson (r) shows Storm Team 4’s equipment to kids.

PHOTOS: BILL BRANSON, ERNIE BRANSON

The 19th Take Your Child to Work Day (TYCWD) on Apr. 24 featured dozens of activities that left kids intrigued, inspired and enlightened by the work their moms, dads and guardians do at NIH. Meanwhile, outside, on Bldg. 1’s lawn under a bright blue sky, an Earth Day celebration was in full swing.

The day’s events kicked off with a family fitness session on the Bldg. 1 lawn with Donna Richardson, a fitness instructor, member of the Presidential Council on Fitness, Sports and Nutrition and ambassador to the First Lady’s “Let’s Move!” campaign. Before leading a group of kids in an aerobic workout, she suggested good seeds we can sow for a healthy future: Get moving (30 minutes of daily exercise for adults, 60 minutes for kids); eat healthy (remember the fruits and veggies); be an ambassador to the Earth (recycle and conserve water); and help others.

### **Day of Discovery**

TYCWD featured educational activities both on campus and off. At the Clinical Center, events included the longtime favorite “Fantastic Voyage.” Kids put on scrubs and visited various work stations from microbiology to chemistry. Over in the CC’s rehabilitation clinic, kids did pulmonary fitness tests and learned how our

muscles use oxygen to make energy for movement. “We also talked to kids about different careers they can have if they study exercise,” said Bart Drinkard, a CC exercise physiologist and physical therapist.

Another popular activity in the CC was the da Vinci Si surgical robot demonstration. Kids learned how the NCI Urology Branch uses robots in surgery. Some kids got to intubate a dummy and others picked up paper clips with a robotic arm. The CC got its first surgical robot in 2006, said Belinda Avila, a CC supervisory health technologist who helped coordinate TYCWD. On average, she said, the CC conducts about 110 robotic urological surgeries a year, mainly partial nephrectomy and prostatectomy. She also talked about sterile processing and noted that all expired surgical supplies in the operating room are either used for training or get recycled.

In Bldg. 31, some kids played a bioengineering video game while others took in a safety demonstration out on the patio conducted by the NIH Police. Over in NIAID’s conference room, Dr. Dawei Lin, senior advisor for bioinformatics, led a series of exercises to show how genetic code letter strands (A, G, C, T) replicate themselves. “Science is related to disease and health but it’s also fun,” he told a roomful of kids, who got to build DNA base pairs out of Legos.







Shown above are (from l) visitors to a table of bone samples; Jared Gollie (r), a doctoral student learning rehab sciences, who shows a child how his heart rate rises while pedaling on an exercise bike as Eric Christensen of the rehab medicine physiology lab looks on; Donna Richardson, ambassador to the First Lady's "Let's Move!" campaign, who leads kids in an aerobic workout in front of Bldg. 1.

### A Greener Environment

Earth Day displays emphasized personal safety, conserving resources and the beauty of nature.

One display featured tips for home and work-place safety with coloring books for the kids. At an NIDCD table, kids spun the Noisy Planet wheel to learn about noise hazards and ways to protect their hearing. NICHD distributed cups of soil to inspire kids to begin their own composting project. NIMHD teamed up with NIH's Bicycle Commuter Club to promote this green mode of transport. Kids rode on a course between Bldgs. 1 and 2 and learned bicycle maintenance tips.

Sometimes, the beauty of nature is clouded over by storms. This year, meteorologist Veronica Johnson from NBC's Storm Team 4 showed kids the cameras and gadgets on the station's weather truck that help predict tornadoes and other severe weather.

Under one tent, the U.S. Army Medical Research Institute of Infectious Diseases had a table for the budding entomologists. Kids fearlessly held live Madagascar roaches that looked half the size of their little hands.

NIH'ers and their kids also learned about the many green features on the NIH campus. William Floyd, director of NIH's Division of Environmental Protection, told kids about the electricity generating plant, the solar panels on several NIH building rooftops and electric vehicle charging stations, to name a few.

It was a day filled with fun activities to educate kids about public health and career paths in science and to suggest ways for people of all ages to create a healthier, greener, sustainable environment for all.



NIH director Dr. Francis Collins (above) and Dr. Lawrence Tabak



### Collins, Tabak Educate, Entertain NIH Kids

Children of all ages flocked to Wilson Hall in Bldg. 1 on Take Your Child To Work Day for a rare opportunity to meet with NIH director Dr. Francis Collins and NIH principal deputy director Dr. Lawrence Tabak.

The children listened intently as Collins explained the function of DNA, how it makes each of us unique and how the discovery of DNA by James Watson and Francis Crick dramatically improved our understanding of disease and our ability to treat it.

When asked why he chose to be a scientist, Collins responded that as a young child his first desire was to be a truck driver. But thanks to the influence of a high school science teacher who inspired his interest in chemistry, he changed course. After a number of questions, including one about whether he built Bldg. 1 (to which he

candidly admitted he did not), Collins pulled out his DNA-inscribed guitar named Rosalind to play an original song called *Walking Through the Genes*.

"Does anyone know why Rosalind would be such a good name for a guitar with a double helix on it?" Collins asked his audience. "Rosalind Franklin did experiments with DNA where she took pictures of it using an X-ray. Watson and Crick figuring out the double helix depended very much on her data from those experiments, but Rosalind Franklin never received credit. So this is Rosalind and every time I pick it up, I think of Rosalind Franklin and what she did to make it possible for all of us to know about DNA."

Tabak, a dentist who previously directed the National Institute of Dental and Craniofacial Research, followed Collins to provide an entertaining and educational discussion on dental health. The topic was of great interest to the children, many of whom shared that they had conducted school science projects looking at the effect of soaking their baby teeth in an acidic liquid such as soda or juice. The effects, they pointed out, were not good. The teeth dissolved, which Tabak stressed was a lesson on why we want to limit our consumption of sugary and acidic beverages. He explained to the kids that if they liked to do science experiments then they may want to work at NIH, where scientists get to conduct experiments every day.

When asked about his favorite part of the event, 12-year-old Aidan Myles said, "The DNA song! It was catchy and Dr. Collins can really sing!"





## TREE

CONTINUED FROM PAGE 1

*Above:* Participating in the planting of the new tree are (from l) Steve Craft of the Archangel Ancient Tree Archive; Dr. David Lipman, director, NCBI; Dr. Donald Lindberg, director, NLM; Dr. Lawrence Tabak, NIH principal deputy director; Christos Panagopoulos, ambassador of Greece; F. Anthony Clifford, chief engineer, NIH; Lynn Mueller, chief landscape architect, NIH; Dr. Constantine Stratakis, scientific director, NICHD.

PHOTOS: BILL BRANSON

rating and preserving this historic living monument for posterity,” said Dr. Lawrence Tabak, NIH principal deputy director.

The tree’s history on campus began in 1961 when the Greek ambassador attended the library’s dedication and presented a cutting from a descendant of the tree where Hippocrates is said to have taught his students. The tree was planted along Center Dr. in 1962 but a combination of problems, including weather and a fungal disease, took its toll. NIH chief landscape architect Lynn Mueller spent decades trying to restore the tree’s health while also exploring a clone. He eventually connected with the non-profit Champion Tree Project, now the Archangel Ancient Tree Archive, which cloned the gift tree.

“The National Library of Medicine and this tree grew up together,” said NLM director Dr. Donald Lindberg. “My thanks go to the NIH and the people who looked after this tree and anticipated the need for cloning.”

Greek Ambassador Christos Panagopoulos also spoke to the crowd that included NIH’s Greek community. “It was 2,400 years ago on the small island of Cos that one of the brightest minds, not only of the period but throughout the ages, Hippocrates, used to gather his disciples around him under the shadow of a plane tree. And this tree lives in this great institution today. It took American ingenuity and dedication.”

Dr. Constantine Stratakis, NICHD scientific director, said, “As a Greek and as an American, as a physician scientist at the NIH, I take pride at this moment—the replanting of a living symbol of the father of medicine on the holy grounds of what is today the modern temple of medicine and science here at the NIH.”

Cloning isn’t the only 21st century twist to the tree’s story. DNA from the gift tree was used to create the first DNA barcode for the Tree of Hippocrates, which is an Oriental plane tree, *Platanus orientalis* (*Platanus* is the species commonly known as sycamore). A barcode is a fragment, or fragments, of a DNA sequence that can serve as a genetic fingerprint. Dr. Amy Driscoll sequenced the tree and produced the barcode. She is project director for the Smithsonian’s Barcode of Life Project. The sequence is available in the Barcode of Life Database (BOLD) and in GenBank, a comprehensive database of DNA sequences at NLM’s National Center for Biotechnology Information.

By comparing DNA sequence information that’s stored in these databases and exchanged over the Internet, scientists can further discoveries, explained NCBI director Dr. David Lipman. “For some species, the spread in the way they look is so extreme that at times scientists have called them different species. Only after we have the DNA sequence to compare, we see they actually are the same species.” Positive identification, he said, is important to conservation efforts, for example, and for basic research and the study of disease.

The new Tree of Hippocrates, surrounded by dogwoods, stands next to the herb garden in front of NLM. Mueller says landscape architects know a lot more about the Oriental plane tree today than when the first one was received.

“This tree does not normally grow here. It’s not in its DNA to fight the Maryland climate,” he said. “We’ll try to create the best environment we can and make up the difference with good landscape practices and lots of TLC.”

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*AAGTGTGGACTCAAAGCTGGTGTAAAGATTACAAATGACTTATTATACCTGACTATGAAACCA
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CGGTCCGGCCGATTCATCGATTTCTGATATTATGATCGATTGGGCGATATGCAAAATCTTCTCTC
ATTATCAAGTGGGCTCTCAAAAGAAAGGTTTATGTAAGTATATATCTGACTTCTG*
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Sequence courtesy of the  
Laboratories of Analytical Biology National Museum of Natural History  
Smithsonian Institution

**The DNA Barcode of the  
Tree of Hippocrates**  
(*Platanus orientalis*)

Genbank Accession: KJ720969  
KJ732974

*DNA barcode of the Tree of Hippocrates, Platanus orientalis*



# feedback

Have a question about some aspect of working at NIH? You can post anonymous queries at [www.nih.gov/nihrecord/index.htm](http://www.nih.gov/nihrecord/index.htm) (click on the Feedback icon) and we'll try to provide answers.

**Feedback:** In 2007, the *Record* reported that a “comprehensive facility evaluation” of Bldg. 31 was under way and that “options for renovation or replacement” would be made. What was the result of that study? While the new Porter Bldg. is great and everyone is happy for the lucky NIH'ers who have a nice, modern building, are there any plans to improve the workplace conditions of those of us who have to work in Bldg. 31? It's been 7 years since the last article—time for an update, please!

**Response from ORF:** The Office of Research Facilities oversaw an analysis of the Bldg. 31 facilities (31A, 31B and 31C). The analysis concluded that the most cost-efficient alternative is a replacement of the buildings. The replacement facility, per the 2013 Comprehensive Bethesda Campus Master Plan, would be planned for the current Bldg. 21 site, adjacent to the Metro station, to make it more user-friendly for staff and visitors using mass transit. Funds for the new facility are not currently budgeted.

**Feedback:** Who scheduled a 1:15 p.m. full-building fire drill for Bldg. 50 during Take Your Child To Work Day? We had to evacuate Bldg. 50 in the middle of an activity. And one of the “safety people” was quite rude about making people (including children) cross a busy street and stand on the sidewalk next to Bldg. 8. Which was a bigger threat—a fire drill or traffic?

**Response from the Office of Research Services:** The Division of Emergency Preparedness and Coordination (DEPC) schedules and administers all emergency evacuation drills on the NIH main campus. DEPC staff were aware that it was Take Your Child to Work Day and that Earth Day festivities were scheduled on that same day. In addition, the Bldg. 50 evacuation team, which includes occupants of the building, were also notified and thought it would be a good learning experience for the children, emphasizing the importance of evacuation drills by allowing children to see that evacuations are not only conducted in schools, but also in the workplace.

Since Bldg. 50 includes laboratory space, signs were posted and multiple email reminders were sent to all emergency contacts for all occupants, with the time and date of the evacuation drill,

almost a week in advance of the actual drill so ongoing experiments would not be adversely affected. This advance notice also allowed events management staff to warn meeting coordinators, attendees and speakers of the upcoming drill in addition to offering parents the opportunity to “opt out” of having their children participate in the drill. The evacuation was intentionally scheduled for 1:15 because the official schedule of events for Take Your Child to Work Day had nothing scheduled in the building during that time.

As to the perceived rude behavior of the evacuation staff, it is the opinion of DEPC and the Bldg. 50 evacuation team that the need to be loud and forceful in order to ensure that hundreds of employees are safe can sometimes be misconstrued as rude. As emergency preparedness representatives, they are not there to be your friends; they are safety personnel charged with moving people quickly away from a building to a safe location. When people do not follow directions, emergency personnel are trained to be the voice of reason. The location across the street is the approved practice endorsed by the NIH Fire Department.



The Division of the Fire Marshal (DFM) was also on hand to witness the evacuation. DFM, along with building evacuation team members, did not see any issues with the children evacuating the building. All evacuated in an orderly fashion and were accompanied by adults or parents. Overall, comments received from the Bldg. 50 evacuation team were overwhelmingly positive.

**Feedback:** Increasingly in the morning I have noticed a trend for employees to pull into the Old Georgetown Rd. and South Dr. entrance and stop short of the ID check. An NIH worker is then dropped off, but not until the passenger changes to the driver's seat, and the employee slowly gets [his or her] things out of the backseat, during which time traffic is backing up onto Old Georgetown Rd. The employee then goes off to enter thru the walking gate entrance while the driver tries to manipulate over to the other lane (in front of entering traffic) to exit back onto Old Georgetown Rd. I am sure these employees do not want to be bothered to take the time to be dropped off at a more appropriate spot—say the “Kiss and Ride” spot which is designed for this very situation. But the result is a traffic jam and safety issues for many other NIH employees who are trying to enter campus during rush hour. Is there any way that NIH Police (or the guards at the entrances) could try to stop this unsafe practice from occurring?

**Response from ORS:** The NIH Police recognize there is a problem with employees being dropped off at the Old Georgetown Rd. and South Dr. entrance, where no safe drop-off point is present. This practice often causes traffic backups and includes the changing of drivers and crossing of entrance lanes to enter exit lanes. The behavior tends to happen more often when there is no police presence.

The NIH Police are appealing to employees to stop this dangerous practice. They recommend commuters use the “Kiss and Ride” parking lot near the Medical Center Metro Station at Rockville Pike and South Dr., or the drop-off lane on West Cedar Ln. behind Bldg. 31, as they were designed for this very purpose and do not cause an inconvenience for other drivers. If voluntary compliance isn't attained, the police reserve the right to utilize further enforcement measures to correct the behavior. 🚓

## Disability Employment Awareness Series Begins, May 27

The Disability Employment Awareness Series is a trio of workshops sponsored by the Office of Equity, Diversity and Inclusion to provide information and strategies for employment of people with disabilities. The first program, a panel discussion on employment of individuals with intellectual disabilities, will be held on Tuesday, May 27 from 11 a.m. to 12:30 p.m. in Wilson Hall, Bldg. 1.

# milestones

## Three NIH'ers Elected to NAS

Three NIH scientists are among 84 new members and 21 foreign associates from 15 countries elected to the National Academy of Sciences on Apr. 29 in recognition of their distinguished and continuing achievements in original research. Those elected bring the total number of active members to 2,214 and the total number of foreign associates to 444.

The NIH'ers are:

Dr. Carolina Barillas-Mury, chief, mosquito immunity and vector competence section, Laboratory of Malaria and Vector Research, NIAID

Dr. G. Marius Clore, NIH distinguished investigator and chief, protein nuclear magnetic resonance section, Laboratory of Chemical Physics, NIDDK

Dr. Shiv I. Grewal, NIH distinguished investigator and laboratory chief, Center for Cancer Research, NCI

The National Academy of Sciences is a private, non-profit institution that was established under a congressional charter signed by President Abraham Lincoln in 1863. It recognizes achievement in science by election to membership and—with the National Academy of Engineering, Institute of Medicine and National Research Council—provides science, technology and health policy advice to the federal government and other organizations.

## NINDS Parkinson's Biomarkers Program Wins Excellence.Gov Award

The NINDS Parkinson's Disease Biomarkers Program Data Management Resource (PDBP DMR) recently received the 2014 Best Overall Excellence.Gov award. Sponsored by the American Council for Technology and Industry Advisory Council (ACT-IAC), the award honors exceptional government programs that use innovative technology to improve services to citizens, enhance government operations and provide a more open and transparent government.

The PDBP brings together stakeholders dedicated to Parkinson's disease research and the discovery of biomarkers for the disease. A biomarker is a biological indicator that can be used to measure disease progress. The PDBP focuses on improved assessment of Parkinson's disease progression and development of new tools and resources to support and accelerate Parkinson's research. The DMR acts as the hub by providing a set of web-

based tools for electronic data entry, quality assurance and controlled access to de-identified data and biospecimens for the broader research community. By standardizing collection and building an intuitive framework for data acquisition, DMR plays a key role in accelerating the discovery and validation of biomarkers for Parkinson's disease. The resource coordinates efforts across government and non-government organizations and serves the public by providing a web site with updated information on PDBP projects and their scientific discoveries.

Each year the ACT-IAC recognizes outstanding government programs at all levels that improve the mission through effective application of information technology. Award categories include excellence in customer experience, digital government, enterprise efficiencies, intergovernmental collaboration, pilots and start-up projects and health IT. Also, judges present a best overall award, which "celebrates 'leap ahead' technologies, strategies or processes that demonstrate how it is possible to achieve groundbreaking results on government programs."

Before the ceremony, held at Arena Stage in D.C., the DMR was a top 5 candidate in the health IT category. However, the group was named best overall because of its extraordinary innovation of integrating scientific discovery and resource sharing—besting its larger IT competitors. Another NIH entry, eVIP-Electronic Vendor Invoicing Program, was a finalist in the pilots and start-up projects category.

Learn more about the PDBP DMR at <https://pdbp.ninds.nih.gov/>.



*New NAS members include (from top) Dr. Carolina Barillas-Mury, Dr. G. Marius Clore and Dr. Shiv I. Grewal.*



*On hand to receive the award were (from l) Stacy Charland, NIH deputy chief information officer; NINDS program directors Dr. Katrina Gwinn and Dr. Margaret Sutherland; and Dr. Matt McAuliffe, chief, CIT biomedical imaging research services section. Other key members not shown are Dr. Debra Babcock and Dr. Beth-Anne Sieber, NINDS program directors; Dr. Coryse St. Hillaire-Clarke, NINDS program analyst; Jenna Linde, DMR study liaison and coordinator of SRA; and Susan Baker, Alison Garcia, Tsega Gebremichael, David Grolling, Barry Landin, Matt Torrenzano and David Vismar, all of Sapient Government Services.*



## Carper Retires After 40 Years at NIH

NEI deputy director Dr. Deborah Carper is retiring after four decades at NIH and 37 years at NEI.

"Few individuals have lived and breathed NEI like Debbie Carper," said NEI director Dr. Paul Sieving. "I am deeply indebted to her for the breadth of institutional knowledge she has brought to the NEI Office of the Director. Her sharp intellect, cool demeanor, attention to detail, seemingly effortless poise and her savvy ability to connect with nearly everyone have made Dr. Carper an invaluable resource to me during her time as deputy director. On behalf of NEI, I thank her for her stellar research accomplishments and for her contributions to the vision research community."



Carper's career at NIH began in 1974 when she took a job as a research technician in Dr. Marshall Nirenberg's lab at the National Heart, Lung, and Blood Institute. In 1976, she joined the NEI Laboratory of Vision Research, headed by the late Dr. Jin Kinoshita, who encouraged her to pursue graduate training. While continuing to work at NEI, she obtained a Ph.D. in zoology at the University of Maryland. Thereafter, she began steadily working her way up the NEI ranks. In 1988, she became a principal investigator within the NEI Laboratory of Mechanisms of Ocular Diseases. From 1995 to 2006, she was chief of the section on molecular therapeutics, as well as coordinator of the NEI research and training section. In 2002, she began working as special assistant to the NEI director until 2010 when she became deputy director of NEI.

Carper devoted a major portion of her research career to understanding how the lens of the eye develops. She studied how cataracts form and why cataracts are linked with diabetic retinopathy, a complication of diabetes that can lead to blindness. As part of an NEI team, she helped characterize aldose reductase, an enzyme implicated in diabetic complications in the eye and other organs. In 1992, she was recognized for her scientific achievement with the Alcon Research Award from the Alcon Research Institute. Later, she contributed to research on treating abnormal retinal blood vessel growth—a major complication in diabetic retinopathy and several other eye conditions.

Earlier this year, NEI honored Carper with the Carl Kupfer Visionary Award for a lifetime of outstand-

ing achievement on behalf of the institute. She was also named by the *Daily Record* as one of Maryland's Top 100 Women who are making an impact through their leadership, community service and mentoring.

When summing up her years with NIH, Carper expressed her gratitude—for the opportunity to grow as a researcher and to contribute to our understanding of eye disease. "Spending my career at NEI was the opportunity of a lifetime," she said. "I feel privileged to have made an impact on science and science leadership in support of the greater vision research enterprise. I am especially grateful for the mentorship I received at NEI and for the students and postdoctoral fellows in my laboratory who contributed to the excitement of scientific discovery."

## NCI's Bini Mourned

Dr. Alessandra Margherita Bini, a highly accomplished and respected scientist at NIH, passed away Feb. 26 of gastrointestinal cancer.

Bini had been a program director in the Diversity Training Branch of NCI's Center to Reduce Cancer Health Disparities (CRCHD) since 2010. "She was passionate about furthering research on cancer disparities and promoting the careers of the young," said Dr. A. Sanya Springfield, CRCHD director.



It brought Bini great joy to work closely with predoctoral students, providing guidance and advice to support the development of their Ruth L. Kirschstein National Research Service Award pre-doctoral fellowship applications, helping to position them to move successfully through the grant submission, review and re-submission process. Last year, she pioneered the introduction of an online-assisted mock scientific review for trainees.

"She had a keen and extraordinarily in-depth perspective of medical science, extensive knowledge of NIH funding systems and a kind and caring heart—qualities that helped make her an outstanding program director," said Dr. Peter Ogunbiyi, chief of the Diversity Training Branch. Always willing to contribute, Bini had been involved in trans-NCI and trans-NIH activities on behalf of CRCHD for the past 4 years.

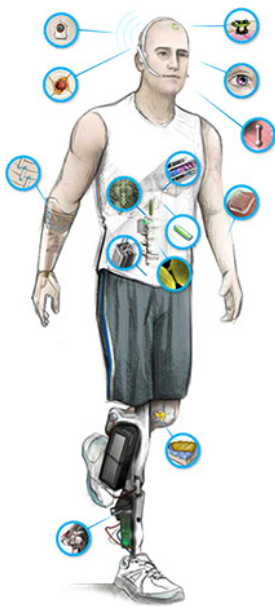
From 2006 to 2010, Bini served as a scientific review officer (SRO) at the Center for Scientific Review, where she worked on various study sections. Prior to that, she was an SRO at the National Institute of General Medical Sciences, National Institute on Aging and the National Heart, Lung, and Blood Institute.

Born in Milan, Italy, Bini earned a Dr. Biol. Sci. degree from the University of Milan, specializing in pharmacology. She received her second doctoral degree in pathobiology and molecular medicine from Columbia University College of Physicians and Surgeons for her research on the role of thrombosis in the progression of human atherosclerosis.

While at the Mario Negri Institute for Pharmacological Research in Milan, Bini pioneered studies on the interaction between thrombosis and cancer. Shortly thereafter, she headed the coagulation and fibrinolysis research unit at Consorzio Mario Negri Sud. After moving to the U.S., she became an associate laboratory member at the New York Blood Center.

In addition to having been published in many scientific journals, Bini had been awarded four U.S. patents for medical technologies that she had invented.

Bini is survived by her son, Matteo Lorenzet, of Bethesda. 🕯



## NIBIB Launches 'Bionic Man' Web Tool

The National Institute of Biomedical Imaging and Bioengineering recently launched the "NIBIB Bionic Man," an interactive web tool that allows students and the public to learn about cutting-edge research in biotechnology.

The bionic man features 14 technologies currently being developed by NIBIB-supported researchers. Examples include a powered

### *NIBIB's Bionic Man*

prosthetic leg that helps users achieve a more natural gait, a wireless brain-computer interface that lets people with paralyzed legs and arms control computer devices or robotic limbs using only their thought and a micro-patch that delivers vaccines painlessly and doesn't need refrigeration. Each technology featured on the bionic man can be clicked on to reveal a short description as well as links to longer news articles or multimedia.

The goal of the bionic man is to inform the public about the many exciting technologies being developed with NIBIB support and to inspire the next generation of bioengineers.

The bionic man can be found at [www.nibib.nih.gov/science-education/bionic-man](http://www.nibib.nih.gov/science-education/bionic-man).



## Red Buckeye Tree In Bloom

*No, it doesn't have anything to do with the Tree of Hippocrates, but the red buckeye (Aesculus pavia) tree near Bldg. 10 is now in bloom. The sign states that the tree is a clone from a Maryland State Champion that died*

*in 2010. "The red bloom is really lovely," notes NCI's Dawn Walker.*

PHOTO: DAWN A. WALKER

*Whether at breakfast, a roundtable discussion or the Collaborating Centre launch event, Dr. Maria Neira emphasized her commitment to preventing adverse environmental impacts on health.*

PHOTO: STEVE MCCAUL



## WHO, NIEHS Partner to Advance Global Health

The World Health Organization has stronger North Carolina connections, thanks to the new NIEHS WHO Collaborating Centre for Environmental Health Sciences. Dr. Maria Neira, director of WHO's public health and environment department, visited NIEHS recently to launch the center, engaging with institute staff and leadership, as well as with representatives from local universities and other organizations interested in global health.

In spite of a network of Collaborating Centres, comprising more than 700 institutions in 80 countries worldwide, this is the first WHO Collaborating Centre established within NIH. Partnership between WHO and NIEHS is nothing new—their joint efforts to advance public health go back nearly 30 years.

NIEHS and NTP director Dr. Linda Birnbaum pointed out that the NIEHS focus on global health began with its second director, Dr. David Rall, who served from 1972 to 1990. "He's the one who said you can't do environmental health unless you do it from a global perspective," Birnbaum said. Formalizing the relationship between the two organizations provides new opportunities for both.

The Collaborating Centre works to translate research findings into public health interventions in five priority areas: children's environmental health, climate change and human health, developmental origins of health and disease, electronic waste and indoor air pollution.

Throughout her visit, Neira stressed the power of preventive health measures to ease the burden of noncommunicable disease. "We are going back to the core of primary prevention, in the hopes that by reducing exposure, we can dramatically reduce the global burden of disease, 25 percent of which is due to environmental exposures," she said.

Underscoring the value of the long collaboration between the two organizations, Neira drew a humorous analogy to marriage. "Couples living together for 30 years sometimes divorce," she said, followed by laughter. "But in this case, we are going for a 'remarriage—it's quite exceptional and provides a solid basis for our future collaboration.'"—Kelly Lenox

## Next Protocol Navigation Lecture, June 2

The IRP Protocol Navigation Training Program Seminar Series continues with a lecture to be held Monday, June 2 from 2 to 3 p.m. in Bldg. 50, Conf. Rm. 1227/1328. The program is a trans-NIH effort to develop resources and tools and to provide training for intramural staff and contractors involved in protocol development, writing, coordination and management. Brett Goltz, IT specialist and contractor with NIAID's Division of Clinical Research, will present "The NIAID iRIS System." For more information, contact Beverly Barham, (301) 594-2494, [bbarham@mail.nih.gov](mailto:bbarham@mail.nih.gov) or Marcia Vital, (301) 451-9437, [vitalm@mail.nih.gov](mailto:vitalm@mail.nih.gov).